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Notes on northern Borneo Myrtaceae

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Summary. While preparing the account of Myrtaceae for the Tree Flora of Sabah and Sarawak, footnotes to species were added, either explaining reasons for nomenclatural changes, or highlighting my views on differences between similar species, especially in field characters. These were, with very few exceptions, not included in the Flora, so are presented here to assist, especially, field workers.

A leading reason why I volunteered a revision of northern Borneo Myrtaceae for the *Tree Flora of Sabah and Sarawak* was the challenge provided by *Syzygium* (Ashton 2011). The largest genus of Borneo trees, with one hundred and seventy eight there recognized by me in Sabah and Sarawak and a further twelve described from elsewhere in Borneo, its species are reputedly notoriously difficult to identify. Further, the second largest genus is *Shorea,* with which I have been familiar for many years. But whereas *Shorea* is subdivided into discrete sections that might justify generic status were visible characters discovered which would match phylogenetic relationships (Ashton 2004), natural groupings based on morphology are less distinct in *Syzygium.* Sections of *Shorea* are distinguished by characters of the androecium, and the flowers are visited either by honey bees (*Apis*) which are distant foragers, or small insects, notably *Trigona* bees, and thrips but probably others according to the section, which normally disperse only short distances; while fruit disperse by gyration, normally also a very short distance in closed forests. *Syzygium* flowers are visited, at least among large-

flowered species, by a variety of insects including bees and wasps, and butterflies; while their fruit are devoured and seeds dispersed by vertebrates, notably birds that may disperse them long distances. Most striking, although dipterocarps are known to freely hybridize, the seemingly trivial characters which distinguish sister species are remarkably constant, even among widespread species. One study has shown that hybrid mortality is high, but apparently rarely surviving beyond the F1 generation (Kamiya et al. 2011, Ashton 2015). Adventive embryony, which can lead to reduction in genetic variation in populations, commonly occurs in both genera (this was found with triploidy, which likewise prevents outcrossing, in one dipterocarp (Wickneswari et al. 1995)). This might explain the occurrence of consistently distinct allopatric forms that I have called subspecies in several *Shorea* and other dipterocarp taxa. But although adventive embryony is well known in *Syzygium* (Tiwary 1926, Kaur et al.1978), interspecific and intraspecific morphological variability is very different in *Syzygium,* and the major cause of difficulty in species definition and diagnosis.

I have always adhered to the broad species view, inspired by that adopted in the *Flora Indica,* and later *Flora of British India,* and advocated by van Steenis for *Flora Malesiana*. Both Hooker and van Steenis accepted a broad concept in part because it yields a simple and accessable account of a flora when patterns of local and regional variation are still poorly known owing to paucity of collections. As a field ecologist, I have marvelled at their foresight. It will always be easier to distinguish new taxa later, when hypothesis can be tested by adequate observation and collection; but it is frustrating indeed, during field observation and especially the close examination of population samples imposed by plot census, when it proves necessary to disentangle rival names where no discontinuity exists. Importantly, with this broad species concept I have found it possible to identify all but a very few of the almost two hundred northern Borneo *Syzygium* on the basis of leaf and twig characters.

Putative natural species groupings in Borneo *Syzygium* are defined in my key to species in Sabah and Sarawak. Although some were formerly awarded generic status, this has not been substantiated by further collections and molecular genetic research (references in Craven et al. 2006). Variability within widespread species appears to be continuous, and local rather than geographical as in *Shorea*. It seems at least in part ecological, in relation to soils. This applies also to apparent sympatric speciation, good examples of which occur in Sabah, both at higher elevations on Mount Kinabalu, and on ultramafics and their adjacent peridotite-derived loams. These are the two themes of the following notes, which also discuss nomenclatural decisions made in the Tree Flora account.

In the notes below I frequently use the abbreviation TFSS 7 to refer to the volume in which my account has been published as Ashton (2011).

SPECIES GROUPS AND PAIRS

Is *Cleistocalyx* a natural group?

Cleistocalyx Bl. was recognized by Merrill & Perry (1937) 322 for that growing number of species which differ from *Syzygium* in their fused sepals, forming an accute snuffer-like bud. Two of the species had a *Syzygium* sister differing consistently solely in this one character, but the discovery of an entity which clearly represents the closed-calyx form of a distinctive *Syzygium,* sharing its habitat and locality, has cast doubt on the validity of the genus. This doubt has been confirmed by molecular genetic evidence (Craven et al. 2006), indicating that cliestocalycine species are scattered among *Syzygium* groupings. Bornean species thus affected are the following:

Syzygium barringtonioides (Ridl.) Masam. var. *quadrisepalum* P.S.Ashton, Kew Bull. 61 (2006) 113, TFSS 7: 177. Differing from the type solely in that the flower sepal lobes are distinct, 4, to 3 × 3 mm, ovate, acute, papery and reflexed at anthesis. Apparently uncommon, on the banks of muddy rivers in the lowlands, which is the same habitat as the type.

Syzygium calyptrocalyx P.S.Ashton. (TFSS 7: 183). Described as *Cleistocalyx leucocladus* Merr. & L.M.Perry. A new name was required because *Syzygium leucocladum* Merr. & L.M.Perry has precedence. This species shares the habitat of *Syzygium havilandii* (Merr.) Merr. & L.M.Perry whose distinctive leaf, frequently with veins narrowly furrowed above, can be indistinguishable from that of *S. calyptrocalyx.* Other than the calyx, the white corky twigs of *Syzygium calyptrocalyx* appear to distinguish it, but this requires more field confirmation.

Syzygium cleistocalyx (Merr.) P.S.Ashton. (TFSS 7: 193). Apparently uncommon, on floodplains and river banks, including behind the mangrove in the tidal reaches; also recorded in the lower facies of upper montane forest on Bt Sempandai, at 1600 m. This extraordinary ecological distribution may imply that the species merely encompasses variants of *Syzygium barringtonioides.* More field observation is required.

Syzygium nervosum DC. (TFSS 7: 248). The most widespread *Syzygium*: from South Asia, Indo-Burma and South China to Australia. Uncommon in Borneo, scattered in evergreen forest, especially in flood plains including shallow peat, and on moist undulating land on fertile clay soils in mixed dipterocarp forest. Apparently more common in Sabah than Sarawak. A light demander, often riparian. Curiously, *Syzygium nervosum* in India*,* still recognized by many foresters there as *S. operculatum,* is best known as a subcanopy tree in moist deciduous forest, and in semi-evergreen forest, while it recurs as a streamside subcanopy species in SW Sri Lanka.

Syzygium perspicuinervium (Merr.) Masam. (TFSS 7:262). *SAN 54612*, which otherwise matches the type, has 4 unequal flower sepals only partially hiding the incrassate corolla dome. The only known flower buds are young. We predict that, as in *Syzygium barringtonioides,* the buds will be larger and more slender at maturity.

Syzygium soepadmoi P.S.Ashton (TFSS 7:285). Endemic to the Bukit Tavai ultramafics, Sabah. Apparently allied to the Philippine cleistocalycine *Syzygium arcuatinervis* (*Cleistocalyx arcuatinervis* (Merr.) Merr. & L.M.Perry, of unknown ecology; but differing in its smaller more coriaceous leaf with obscure venation and, notably, its calyx which, although with united lobes, opens in an apical pore.

Groups whose species are geographically and/or ecologically distinct

These groups represent, in my understanding and with exception of the first, species series that have diversified so far that they no longer form natural series of sisters, albeit differing mostly only in seemingly trivial characters.

The Aphanomyrtus Group

Aphanomyrtus Miquel is based on the Sumatran *A. rostrata* Miq. which shares, with *Syzygium caudatum* (Merr.) Airy-Shaw, *S. skiophilum* (Duthie) Airy-Shaw and *S. biniflorum* (Ridl.) P.S. Ashton, a short inflorescence and small flowers with few stamens. Although a field description of *A. rostrata* is unavailable, all appear to be small slender trees of understorey shade. They are thus analogous to the species groups in several other rainforest genera in which the understorey habit is associated with reduction in flower size and, particularly, the number of stamens, a view supported by the many staminodes of *Syzygium biniflorum*. To them might be added the upper montane forest canopy species *Syzygium quadricostatum,* with 10 stamens. *Syzygium biniflorum, S. olivaceum* and *S. skiophilum* do appear to be sister species, but the others more likely evolved independently. Study of of their breeding systems is merited.

Syzygium skiophilum Airy Shaw. (TFSS 7: 284). Sister species to *Syzygium biniflorum.* Merrill and Perry described the stamens of *S. filicaudum* (holotype: *Endert 3680*, Kong Kemul, E. Kalimantan, BO) which I consider a synonym, as 'many'. I failed to find evidence of this in the type specimen at A, or of other Borneo material now available, where they all prove to number 8.

A seemingly natural group: the Attenuatum Group (TFSS key, p. 137)

The following species are united by their distinctive clove-shaped flower buds, and by their small to medium sized ovate to elliptic more or less coriaceous leaves, black dotted beneath and drying ocherous to rust-brown. They appear to form a natural series of sisters, mostly

differing in trivial characters of leaf and twig.

Syzygium adenophyllum Merr. & L.M.Perry. (TFSS 7: 165). Easily confused with *Syzygium napiforme* whose carrot-shaped fruit is distinctive, and its wartiness visible in the flower bud. The twig in that species is grey-brown, not distinctive whitish as in *Syzygium adenophyllum*. Further collection may yet prove the two synonymous.

Syzygium attenuatum (Miq.) Merr. & L.M.Perry. (TFSS 7: 172). Our form differs from that general in Peninsular Malaysia and Sumatra in its shorter, few-flowered panicle, larger fruit and obscure leaf venation; but in the following collections the panicles are much branched and floriferous, the fruit to 7 × 5 mm, and the venation (*Sugau JBS 70*, *S 67512* excepted) distinctly raised beneath with the tertiary venation forming a fine net, in these respects resembling the Sumatran type form: Sabah: *SAN 32362* Sosopodon Ranau, *JBS 70* route to G. Alab Tambunan, *SAN 35054* S. Liwagu Ranau, *SAN 62202* M.38 Ranau road; Sarawak: *S 22190* Bt Meninga, *S 25673* Bt. Mabong Melinau, *S 67512* Bt. Lanjak Ulu Ai; Brunei: *Schatz et al. 3303*, Bt. Belalong; W. Kalimantan: *Laman et al. s.n*., G. Palung. With the exception of the last, these were collected from upper dipterocarp forest at 800–1400 m.
A distinct variety is found on Kinabalu (e.g. *SAN 57802*, Power Station) in which the leaves are more leathery, drying red-brown.

Syzygium flagrimonte P.S.Ashton. (TFSS 7: 207). A distinctive upper montane apparent point endemic distinguished from *Syzygium napiforme,* which appears to be its sister species, by its habit and smaller subacute to obtuse leaves with 8 pairs of veins, and unusually slender floral pseudostalk.

Syzygium fusticuliferum (Ridl.) Merr. & L.M.Perry. (TFSS 7: 210). Difficult to distinguish from *Syzygium oligomyrum* juveniles when not in flower, though in that species the leaf dries distinctly rust- to buff brown, rather than chocolate-brown. When in flower, the prominent sepal lobes, almost enveloping the corolla, distinguish it.

Syzygium napiforme (Koord. & Valeton) Merr. & L.M.Perry. (TFSS 7: 247. This species still requires comparison with *Syzygium rynchophylla* Miq. of Java, whose type I have not seen.

Syzygium oligomyrum Diels. (TFSS 7: 254). Easy to confuse with *Syzygium fusticuliferum,* and *S. monticolum* of the Chloranthum Group, when an immature tree. The type represents the immature leaf form but the flowers, venation and pits on the blade above are characteristic. *Syzygium ochneocarpum* (holotype *Elmer 21522*, Tawau, Sabah, UC, iso: A, NY), which represents the mature form, is reduced here.

The Chloranthum Group **(**TFSS key, p. 138)

This is a small group of apparent sister species, *Syzygium chloranthum* (Duthie) Merr. & L.M.Perry and two others:

Syzygium caryophylliflorum (Ridl.) Merr. & L.M.Perry. (TFSS 7: 184). Doubtfully distinct from *Syzygium chloranthum.* The strongly ascending venation somewhat more distinct beneath, with more and longer intermediates distinguish it.

Syzygium monticolum Merr. & L.M.Perry. (TFSS 7: 242). Closely resembling *Syzygium chloranthum* also*,* but the pimpled thickly leathery leaf blade and more slender flower pseudostalk distinguish it.

The Zeylanicum Group (TFSS key, p. 135)

This is the most easily distinguishable natural group within Borneo *Syzygium,* recognized by their generally square or narrowly winged twigs, milky bloom, persistent bracteoles, and cylindrical calyx. Again with a few exceptions, the species are specialists of *kerangas,* upper montane forest, and other forests on humult soils.

Syzygium antisepticum (Bl.) Merr. & L.M. Perry. (TFSS 7: 168). The species complex that includes *Syzygium antisepticum, S. gratum, S. ovatifolium* and also *S. zeylanicum* requires further study in the field, and throughout Asia. All but one are species of lowland and hill dipterocarp forest on humult soils. Herbarium material alone leads me to suspect a single variable species, but there seem to be entities with distinct ecologies. *Syzygium antisepticum,* there formerly called *S. gratum,* is a sea-shore plant in Peninsular Malaysia. This species around Kinabalu was formerly recognized as *Syzygium ovatifolium,* holotype: *Clemens 28478* Mt Kinabalu (iso A, BO, L, NY).

Syzygium zeylanicum (Bl.) Merr. & L.M.Perry (TFSS 7: 302) therefore remains as one variable species in my understanding, several forms having been described as separate species which I doubt. *Syzygium gratum* was one, which was reduced here by Kochummen (1978, 217, as *E. spicata*), as also was *S.antisepticum.*

Syzygium bankense (Hassk.) Merr. & L.M.Perry. (TFSS 7: 174). This is the core lowland species of a group characterised by their tiny leaves and quadrangular distinctly albeit narrowly winged twigs. All are recognized as *ubah ribu.* Those that have been decribed from Borneo mountains are: *Syzygium gaultherioides* (Ridl.) Merr. & L.M.Perry in west to north-east Sarawak and Brunei, *S. perparvifolium* (Merr.) Merr. & L.M.Perry in West Kalimantan and West Sarawak, *S. nummularium* Airey-Shaw from north-east Sarawak and Brunei (see there), and *S. kinabaluense* (Stapf) Merr. & L.M.Perry, *S. exiguifolium* Merr. & L.M.Perry and *S. polycladum* Merr. & L.M.Perry from Mount Kinabalu and sometimes on the north-east Sarawak summits. We here recognize three species two of which, *Syzygium bankense, S. kinabaluense,* have more or less distinct forms (see TFSS keys). The Bangka type has larger leaves than is general in Borneo, in this resembling the Peninsular sister entity, *Syzygium nitidulum* (Ridl.) I.M.Turner.

Syzygium bankense subspecies *perparvifolium* (Merr.) P.S.Ashton (TFSS 7: 175). The holotype was formerly at the Manila herbarium, now destroyed. Differing from the type subspecies in its more densely congested inflorescence at most 1.5 cm long clustered at the first 2(–3) twig nodes, much branched twigs, and ovate-lanceolate or obovate 5–7 × 4–6 mm leaf blade with evident veins. We here reduce *Syzygium gaultherioides,* holotype: *Haviland 2057* Mt. Bungoh, W. Sarawak, which is within the range of variation of current collections of this subspecies.

The Jambos Group (TFSS key p. 132)

This, the largest apparently natural species series in Sabah and Sarawak, is united around a core easily distinguished by their large flowers with urn-shaped calyx tube, hardly swollen hypanthium, calyx lobes distinctly hyaline-translucent towards their margins and becoming refleexed, and leaf baldes frequently cordate and with prominent unequal lateral veins, furrowed above. It includes all the comestable *jambu* excepting *Syzygium cumini* which does not naturally occur and is not cultivated in our area.

Syzygium jambos (L.) Alston. (TFSS 7: 227). The wild form found in Sabah and Sarawak is the native tree formerly known as *Syzygium monanthum* (Merr.) Merr. & L.M.Perry, holotype: *Haviland 2146*, Belaga, Rejang, Sarawak (SING, iso K, reduced here by me (TFSS 7: 227)). It differs from the cultivated, albeit not consistently, in the more persistently 4-angled twig, leaf wrinkling on drying, smaller flower with more leathery sepal lobes and, of course, its smaller fruit.

Syzygium medium (Korth.) Merr. & L.M.Perry. (TFSS 7: 241). Further field study may reveal this entity to be a rheophytic juvenile ecotype of *Syzygium jambos*.

The Claviflorum Group (TFSS key p. 137; sub.gen. *Perikion* Craven & Biffin, *Blumea* 55, 2010: *Syzygium claviflorum* and its sisters)

Syzygium claviflorum Wall. ex Steudel (TFSS 7: 192) is variable in the size of its parts, including flowers with torch-shaperd calyx, but this variation appears continuous

Syzygium cornuflorum P.S.Ashton (TFSS 7: 195) is distinguished from it by its small leaves, and smaller flowers with striking cornet-shaped calyx.

Syzygium viridifolium (Elmer) Merr. & L.M.Perry. (TFSS 7: 301). I do not accept Henderson's view (Gard. Bull. Singapore 12 (1949) 253) that this entity is synonymous with *Syzygium claviflorum.* Although the flowers are similar, the parts are smaller and the leaf elliptic not elliptic-lanceolate, and dark dotted beneath.

***Syzygium castaneum* (Merr.) Merr. & L.M.Perry and its sisters**

Syzygium castaneum is a common and variable species of humult yellow and white sandy soils, in primary and secondary dipterocap forest, *kerangas,* karst, and upper montane forest.

Syzygium georgei P.S.Ashton (TFSS 7: 212), known only from the type locality, where it is common along a stony occasionally flooded river bank on ultramafic substrate. Clearly related to *Syzygium castaneum,* I only recognize it from that variable species owing to its conspicuously different leaf shape with its venation distinctly furrowed on its upper surface. This is a candidate for sympatric speciation.

Syzygium paludosum P.S.Ashton (TFSS 7: 257), is locally frequent in mixed peat swamp forest, also rare in mixed dipterocarp forest on deep yellow humic sands on coastal hills. Also closely related to *Syzygium castaneum* and with its slender dark quadrangular twigs with distinct upcurling flakes , it differs in its larger parts, elongate bud, and dull leaf blade.

Syzygium longiflorum*, *S. rostratum* and *S. pyrifolium

Three similar small leaved species of Java and widespread throughout the Sunda dipterocarp forests.

Syzygium pyrifolium (Bl.) DC. (TFSS 7: 271). Henderson provides a useful table indicating the differences from *Syzygium longiflorum.* He cites broad shallow caducous *versus* deep oblong persistent sepal lobes, pseudostalk with distinct medial constriction, and larger spherical to depressed-spherical apically rimmed fruit ripening brownish green *versus* oblong-ovoid fruit with prominent sepal lobes, ripening white. The following collections, from *kerangas,* mixed peat swamp forest and the lower facies of upper montane forest along ridges at c.1000 m, differ in their more leathery chocolate-brown drying leaf blade and shorter panicle, but in other characters including flower and fruit appear to be this species: Sarawak: *S 33872* Bt Peninjau Lanjak-Entimau P.F. Lubok Antu*, S 45033*, *45084* Bt Sadok. Sabah: *SAN 86228* Sipitang. Brunei: *BRUN 178*, K. Ingei Belait.

Syzygium racemosum (Bl.) DC. (TFSS 7: 273) differs in the field in its somewhat larger leaf blade with more distinctly raised venation beneath, and round young twigs.

Syzygium rostratum (Bl.) DC. (TFSS 7: 279). Difficult to distinguish from *Syzygium longiflorum.* The shorter to vestigial flower sepal lobes, relatively broader smaller prominently caudate leaf blade, and fruit shape mentioned in the literature for this species sometimes overlap with *Syzygium longiflorum* in Borneo where there may be hybridization, but less so in Java and Sumatra. The generally larger sepal lobes of *Syzygium longiflorum* become apparent only at anthesis and especially when flared outwards on a prominent rim in the young fruit; but I find that the lobes may become prominent in the young fruit of *S. rostratun* also (e.g. *Wong WKM 140* S. Liang arboretum, Brunei). However, in *Syzygium longiflorum*

the panicle is consistently more branched, whereas in *S. rostratum* the fruit becomes borne on long rigid rachises. Also in *Syzygium longiflorum,* the intermediate and tertiary veins typically are less dense, and the tertiaries more overall parallel with the veins are generally minutely impressed above in the dry mature leaf; while the gland dots beneath are scattered not dense.

Syzygium rugosum Korth. (TFSS 7: 280), a further small leaved species of Peninsular Malaysia, South and West Borneo of dipterocarp forests on siliceous soils, differs in its short flower bud and leaden-drying leaves with shagreened undersurface.

Other species pairs

Syzygium pterophorum Merr. & L.M.Perry. TFSS 7: 267). *Syzygium pterophorum* is sister to *Eugenia pseudotetraptera* King, which occurs widespread in the same habitat as in Peninsular Malaysia. It was reduced to a variety of the exclusively lowland *Syzygium tetraptera* Miq. by Henderson (Gard. Bull. Singapore 12 (1949) 220). King's plant differs from the present only in its smooth (drying wrinkled) flower calyx, shorter pseudostalk and apparently earlier caduceus bracts; it and possibly also *Syzygium tetraptera* may prove to be synonymous.

Syzygium steenisii Merr. & L.M.Perry and *Syzygium subcrenatum* Merr. & L.M.Perry (TFSS key, p. 141). *Syzygium steenisii* differs from *S. subcrenatum* in its distinct flower sepal lobes, also in its leaf with less prominent venation, no marginal teeth and smaller size. It is distinguished from *Syzygium punctilimbum* by its terete twig and elliptic cuneate-based leaf blade with tertiary veins clearly elevated on both surfaces; and from *S. confertum* by its dull blade with dense subequal venation and short acumen. *Syzygium subsessilifolium* (Merr.) Merr. & L.M. Perry. (TFSS 7: 289), represented by a collection from Lake Toba, Sumatra, *Ruttner 182*, may prove to be this rare Bornean species of sluggish lowland river banks.

Syzygium nemestrinum (Henderson) I.M.Turner and *S. prasiniflorum* (Ridl.) Merr. & L.M.Perry. These two entities require more field observation. *Syzygium nemestrinum* differs from *S. prasiniflorum* in its dull leaf blade somewhat yellow-brown pale beneath, and generally, its densely dotted and pimpled blade beneath, also its larger flower. Overall though, I have found *Syzygium nemestrinum* difficult to define owing to its overall lack of diagnostic characters. The leaf dots are variably prominent below and sometimes obscure, but the undersurface is always dull and usually somewhat milky. The sepals may be distinct and shallowly hemispherical in young bud but become stretched and more or less obscure at or following anthesis. I finally concluded that it should be considered a synonym of *Syzygium subcrenatum* Merr. & L.M.Perry, in which the dentate margin appears to be sometimes absent (TFSS 7: 288). *Syzygium prasiniflorum* (TFSS 7: 266) is also a poorly known species without clear diagnostic characters. The leaf recalls that of *Syzygium punctilimbum* but for its base. Easily confused also with *Syzygium havilandii,* which differs in the round twig and dull not glistening leaf with veins minutely furrowed above, and by its abundant stilt roots.

From *Syzygium nemestrina* it differs in its generally slightly glistening leaf blade above and usual absence of dots beneath, besides its much smaller flower.

Syzygium elliptilimbum and *S. maingayi*: *Syzygium elliptilimbum* (Merr.) Merr. & L.M.Perry. (TFSS 7: 201). This large-leaved species is distinguished by its thinly leathery leaf with slender venation, but prominent beneath, not furrowed above, the tertiaries beneath an open lattice, drying rich crimson-brown beneath with the venation the same colour. The panicle is slender and much branched, with many small flowers. It is apparently allied to *Syzygium maingayi* (see there). Merrill & Perry (Philip. J. Sc. 79 (1950) 388) recorded this species from Mindanao and the Sulu Archipelago, reducing *S. suluensis* Merr. here; but the type of that species has a much larger flower and short hardly branched rachis. *Syzygium maingayi* Chantar. & J.Parn. (TFSS 7: 240) differs from *S. elliptilimbum* only in the broader larger darker drying thinner textured leaf with somewhat shorter stalk. Further collections may prove them synonymous.

Syzygium houttuyniifolium P.S.Ashton. (TFSS 7: 220) Known with certainty only from the Usun Apau, Ulu Baram-Rejang divide, Sarawak (the type; *S. 68937*, Ulu Kelayan). *Syzygium houttuynii* Merr. & L.M.Perry (TFSS 7: 220) differs in its quadrangular twig, smaller leaf with intramarginal vein close to the margin and hardly looped, and in its hardly branched panicle and large flower.Two further collections resemble *Syzygium houttuyniifolium* but differ as follows: *SAN 100132*, *Amin G. et al.*, SW Segindai across S. Liwagu, Ranau, ultrabasic substrate, has a glistening leaf and somewhat larger flower bud; *Arbainsyah SA 1944*, G. Kedamuk posko 235 km 11, has a thickly leathery leaf blade with short stout stalk.

Sister species with apparent sympatric speciation

The following are entities that I have recognized as natural species series. They share a set of diagnostic characters, of flower, leaf, and twig, but may differ in the size of their parts, and seemingly more trivial characters of inflorescence,leaf thickness, margin or venation prominence, indumentum and other parts; but they are at best only partly diversified by habitat, geography, or both. Further studies of populations in the field are required before their status can be confirmed.

Syzygium fastigiatum (Bl.) Merr. & L.M. Perry, *S. cuneiforme* Merr. & L.M.Perry, *S. odoardoi* Merr. & L.M.Perry, and *S. neriifolium* Becc. (TFSS key, p. 136). *Syzygium cuneiforme* is at once distinguishable by its substantially larger parts, but the other three are debatable. *Syzygium fastigiatum* bears a similar relationship with *S. odoardoi* that *S. jambos* does with *S. medium*. *Syzygium fastigiatum*, very variable in both leaf shape and colour and panicle size, has a wide ecological range if that variation is accepted as intraspecific. *S. odoardoi* and *S. neriifolium* are both principally riparian. A hill form of *Syzygium odoardoi,* as defined by me, comes close to *S. fastigiatum*, which differs in the less branched panicle with fewer

flowers and generally narrower leaves. The two species nevertheless merit more detailed field study of their variation and ecology. Further, more collections are needed to decide whether *Syzygium odoardoi* is truly distinct from *S. neriifolium.*

Syzygium pycnanthum Merr.l & L.M.Perry (TFSS 7: 269). This very variable and common riparian species was formerly called *Eugenia densiflora* (Blume) A. de Candolle. I have reduced *Syzygium foxworthianum* (Ridl.) Merr. & L.M.Perry here as I have concluded that it represents the rheophytic phenotype on open shingle banks, or a juvenile form, again recalling the relationship between *S. jambos* and *S. medium.*

Syzygium beccarii (Ridl.) Merr. & L.M.Perry and *S. gladiatum* (Ridl.) Merr. & L.M.Perry (TFSS key, p. 138). Large-leaved forms of *Syzygium beccarii* cannot consistently be distinguished from *S gladiatum* which may eventually prove synonymous. Small-leaved forms resemble *Syzygium punctilimbum,* which can be distinguished by its quadrangular twigs. *SAN 49332*, Bt Madai, Mostyn, Sabah was from 'mossy forest' on limestone at 400 m; it bears unusually large flowers on short congested terminal rachises, but otherwise shares the characters of this species. *S 41764*, Ulu Kana, Anap, shares the long panicle of *S. gladiatum*, but the flowers are intermediate with *Syzygium beccarii*, which is indistinguishable on vegetative characters. Further collections may reveal these two entities to be forms of the same species.

WIDESPREAD SPECIES WITH COMPLEX VARIABILITY

In these taxa, variation is substantial but I have failed to find those necessary discontinuities that could separate distinct species from the complexity.

Syzygium urceolatum Merr. & L.M.Perry and allied species (TFSS keys, pp. 145, 164)
I interpret this species as the most variable, morphologically and ecologically, of the lowland forest *Syzygium*.
Subspecies *urceolatum* (TFSS 7: 296). The type differs from ssp. *kuchingense* in its chartaceous blade with depressed veins above. I have interpreted it as the plant of *kerangas* and its ecotone with mixed dipterocarp forest. It generally has smaller thickly leathery leaves than the ssp. *kuchingense;* the depressed main and intermediate veins above are the defining character. Merrill & Perry compared this entity with *Eugenia hemsleyana* King, and Henderson (Gard. Bull. Sing. 12 (1949) 129) considered it synonymous, but the leaf of that species is much larger and not milky beneath and Kocummen kept it separate (1978, 196).
Subspecies *palembanicum* (Miq.) P.S.Ashton (TFSS 7: 296) most resembles *Syzygium hemsleyana* (King) I.M.Turner, and is the form in mixed dipterocarp forest on loam soils. It is distinguished notably by the absence of milkiness on the twig, and the leaf which is often shiny. Subspecies *palembanicum* differs from *Syzygium grande* (Wight) Walp., besides the ribbed calyx in flower and fruit, in the less prominent venation, hardly raised or occasionally shallowly sunken above, and somewhat smaller flower bud with subequal sepal lobes.

I recognize the following as distinct sister species:

Syzygium borneense Miq. (TFSS 7: 179). This variable species was previously often called by its synonym *Syzygium litseaefolium* in Borneo, and *Eugenia pseudosubtilis* King and *E. microcalyx* Duthie in Peninsular Malaysia. Lowland and montane varieties are formally recognized in continental Asia, but are not clearly distinguishable in Borneo where the species apparently does not reach above 800 m. In Thailand, Parnell & Chantaranothai recognize *Syzygium borneense* with *S. microcalyx* a synonym, and *S. cinereum* (Kurz) Parnell & Chantaranothai with *S. pseudosubtilis* a synonym (*Fl. Thailand* 7, 4 (2002) 838); but they differentiate the two in their key on a subtle difference in twig colour. I have not had the opportunity of examining the Thai material in sufficient detail to form an opinion on their decision in context of the variation observed in Borneo. I also reduce here *Syzygium hackenbergii* Diels, based on *Hackenberg 17*, Sampit, W. Kalimantan (holotype B, destroyed, fragment in A), a specimen with smaller than average leaves distinctly dotted above.

Syzygium korthalsianum Miq. (TFSS 7: 306), a Sumatran species, was noted from Indonesian Borneo by Merrill and Perry (*ibid.* (1939) 191). Those collections I have examined seem not to be this species. *Eugenia embelioides* Ridl., (*Syzygium embelioides* (Ridl.) Masam.), based on *Beccari 3354*, Danau Lamadjan (close to the Sarawak border), which was reduced to *S. korthalsianum* by Merrill and Perry, appears to represent a form of *S. borneense.*

Syzygium creaghii (Ridl.) Merr. & L.M.Perry. (TFSS 7: 197). NE Borneo, in mixed dipterocarp forest on moist slopes. Based on *Creagh 7* and *Burbidge s.n.,* Sabah (K). The Bukit Mersing collection has leaves with c. 30 pairs of main veins, and internodes prominently ribbed distally. The typical form occurs in the Lambir N.P. tree demography plot.

Syzygium griffithii (Duthie) Merr. & L.M.Perry (TFSS 7: 217) generally has a distinctly narrower leaf with deeply impressed veins above. The rigid racemose inflorescence with branches subterminal, and the flower pseudostalk as long as the receptacle are diagnostic. It differs from *Syzygium confertum* (Korth.) Merr. & L.M.Perry, when not in flower, mainly by its larger generally narrowly oblong thickly leathery leaf with spreading veins furrowed above.

Syzygium kunstleri (King) Bahadur & R.C.Gaur. (TFSS 7: 233). Though generally easy to identify owing to its cream twigs and bright red-brown drying somewhat obovate leaf blade, this species is very variable in leaf size and shape; the blade may dry grey-green though the dense fine generally dark pimples beneath are indicative; the twig is also sometimes grey-brown. I reduced here *Syzygium albidirameum* (Merr.) Merr. & L.M.Perry (holotype: *Elmer 21762*, Tawau, Sabah, UC; iso: A, NY), *S. chrysanthum* Merr. & L.M.Perry (holotype: *Maiden, SAN 1746*, Kinabatangan, Sabah, A), and *S. stictophyllum* Merr. & L.M.Perry (holotype: *Clemens 50344*, Penibukan, Kinabalu, A) which come within the range of variation of the present species.

Syzygium oblanceolatum (C.B.Rob.) Merr. (TFSS 7: 251). Eastern Philippines and Borneo. In mixed dipterocarp forest on clay loam. *Syzygium kihamense* Merr. & L.M.Perry (holotype: *Endert 2341*, Batu Bong, near Kiham, W. Kutei, Kalimantan, BO, iso:K) and *S. petakense* Merr. & L.M.Perry (holotype: *Endert 4063*, near Long Petak, W. Kutei, BO, iso: K) differ in no consistent way from this Philippine species though the leaf base is more frequently narrowly obtuse, the intermediate veins few or absent, in the latter. Some Kinabalu collections differ in their smaller leaf with as few as 7 pairs of veins, but the variation with the type appears to be continuous. Related to *S. papillosum* (Duthie) Merr. & L.M.Perry of Peninsular Malaysia and southern Kalmantan, in which the twig is round leaf is more leathery, the base deeply cordate.

Syzygium palawanense (C.B.Rob.) Merr. & L.M.Perry. (TFSS 7:256). Eastern Borneo and Palawan. The narrow leaf with few veins and densely finely pimpled upper surface are distinctive and distinguish this species from e.g. *Syzygium remotifolium*. Collections from lower montane forests on Kinabalu differ in their generally fewer, 6–9 pairs, of veins.

Syzygium scortechinii (King) P.Chantar. & J.Parn. (TFSS 7: 282). The many collections now available show continuous variation between the forms described as species by Merrill and Perry (*Syzygium heterocladum* (Merr.) Merr. & L.M.Perry, holotype formerly PNH, iso: K; *S. kingii* (Merr.) Merr. & L.M.Perry, holotype *Ridley 9071*, Bongaya, Sabah, SING, iso: K) and between them and the peninsular species *S. scortechinii.* Related to *Syzygium panzeri*, which differs in its distinctly smaller subsessile flowers, and more conspicuously and continuously narrowly 4-winged white twigs; nevertheless not reliably distinguishable when not in flower; and to *S. insigne* (Bl.) Merr. & L.M.Perry of South Kalimantan, which differs in its smaller more prominently dotted leaf and quadrangular twigs. Some Sabah collections (e.g. *SAN 38235*, Sekong Kecil, *SFN 19064a*, Bettotan, Sandakan) differ in their leaves drying pale beneath, with slender tapering base and hardly shouldered twigs, but their flowers and fruits are typical.

Syzygium tawahense (Korth.) Merr. & L.M.Perry (TFSS 7: 291) is similar in field characters to *S. urceolatum* ssp. *palembanicum* and *kuchingense,* but with leaf veins more prominent especially above, longer more slender flower bud with smaller calyx lobes than ssp. *palembanicum*, and more prominently ribbed more or less warty fruit . Thorough examination of variation throughout Borneo is needed to assess whether reduction of this species is warranted.

Syzygium valdecoriaceum P.S.Ashton (TFSS 7: 297) differs from *S. griffithii* in its yet more thickly leathery leaves drying pale yellowish brown, with less prominent veins and tertiaries obscure beneath.

Leptospermum javanicum Bl. (TFSS 7: 103). Widespread from southern Burma throughout Sunda to the Philippines and Java. On the high mountains of Sabah and Sarawak in rocky places in upper montane forest, between 1200–2400 m, to 3000 m on Kinabalu and adjacent

mountains including in scrub on ultramafics. Also on exposed coastal hilltops near Kota Kinabalu and Sandakan, Sabah. Trees from lower altitudes do generally bear larger thinner leaves, but their size is very variable.

Diversification on the Sabah ultramafics and Borneo karst: A special case

The Sabah ultramafic oolites, as in other regions and climates, support distinct forms of many, and in the case of Myrtaceae most, of the taxa able to survive on their soils, potentially toxic with nickel and chromium ions. Some forms I have recognized as distinct locally endemic sister species. In several cases, sympatric speciation with adjacent widespread sister entities is possible, meriting investigation.

Leptospermum javanicum Blume (TFSS 7: 103) and *L. recurvum* Hook.f. (TFSS 7: 105): *L. recurvum* occurs from c. 2600 m to the summit on Kinabalu, especially on ultramafics at its lower altitudes. Abundant at high altitudes. Also occurring near the Trus Madi summit, 2650 m, and from Sulawesi. Recognized by smaller more thickly coriaceous leaves, glossy above, with consistently narrowly revolute margin, and its hypanthium lacking minute warts. Although Thompson (*Telopea* 3 (1989) 391) questions the distinctness of this taxon as a species from *L. javanicum*, naturalists familiar with it are convinced and I accept their verdict. D.W. Lee. & J.B. Lowry (Bot. J. Linn. Soc. 80 (1980) 223-242), compared the ontogeny and morphology of the two species in the field on Mount Kinabalu. Though convinced of their separate identity, they found isozymal evidence that *L. recurvum* juveniles have limited genetic variability and suggested a sympatric origin. The putative existence of this same species on Sulawesi makes this unlikely. Nevertheless, molecular examinations of both species on Kinabalu and *Leptospermum recurvum* populations on Sulawesi could be rewarding.

Syzygium acuminatissimum DC. (TFSS 7: 164). An exceptionally widespread variable species, from India to South Chin and New Guinea, as I interpret it. Specimens from ultramafic substrates,e.g. *SAN 138824*, Bukit Tawai summit, Karamuak, Telupid, Sabah, are particularly distinct on account of their large leathery somewhat glistening leaves.

Syzygium beccarii (Ridl.) Merr. & L.M.Perry (TFSS 7: 177). Collections from Tawai Forest Reserve, *FRI 41253*, *Mat-Salleh KMS 3398*, *Cheksum & al. 235*, from riparian forest (the same tree?) present a distinct appearance owing to their relatively small dark drying leaves and up to 8 cm long spreading terminal panicle clusters. I hesitate to recognize this form as a distinct entity within this variable species, awaiting further material.

Syzygium caudatilimbum (Merr.) Merr. & L.M.Perry (TFSS 7: 186). An astonishing specimen from the Mt. Silam, Lahad Datu ultramafics, *SAN 135045*, has unusually large leaves, the veins distinctly elevated beneath with the intramarginal veins ascending from the base like subopposite basal veins; but the clustered axillary fruits are typical. The twig is massively

swollen, the swellings punctured with pores suggesting ant habitation.

Syzygium claviflorum Wall. ex Steudel, subspecies *tavaiense* P.S.Ashton (TFSS 7: 193). Based on two collections apparently simultaneously gathered from the same tree, the type and *Bojo & Cheksum OB 40*, from Tawai F.R., on ultrabasic substrate.

Syzygium dasyphyllum Merr. & L.M.Perry (TFSS 7: 200). A distrinct species in the Jambos Group, distinguished by its relatively small leaves for this group, thickly coriaceous. Endemic to Mt. Kinabalu, in the lower facies of upper montane forest at 900–2300 m, apparently only on ultrabasic substrates.

Syzygium georgei P.S.Ashton (TFSS 7: 212), known only from the type locality, where it is common along a stony occasionally flooded riverbank on ultramafic substrate. Clearly related to *Syzygium castaneum,* I only recognize it from that variable species owing to its conspicuously different leaf shape with its venation distinctly furrowed on its upper surface. This is one more distinct sister ecospecies of ultramafic substrates, for which the Tavai Forest Reserve provides the richest repository.

Syzygium kinabaluense (Stapf) Merr. & L.M.Perry subspecies *exiguifolium* (Merr. & L.M.Perry) P.S.Ashton (TFSS 7: 231). Distinguished by the small size of its parts and distinct leaf shape, this form occurs on ultramafics in the Kinabalu lower montane *kerangas.* Subspecies *polycladum* (Merr. & L.M. Perry) P.S.Ashton (TFSS 7 *loc. cit.*), rarely collected but also once on Mt. Pagon Periok, Brunei, has yet smaller parts and shares the same lower montane habitat, but here over sandstone.

Syzygium roseomarginatum (C.B.Rob.) Merr. & L.M.Perry (TFSS 7: 278): The typical form occurs on the Kinabalu ultramafics; but *SAN 74896*, from ultramafic Mt. Silam, Lahad Datu so rich in point endemics, resembles this species in leaf though atypically large, but the up-to-3 axillary short congested inflorescences with up to 5 mm long acicular bracteoles are different. It may, with further collections, prove to be a separate species.

Syzygium soepadmoi P.S.Ashton (TFSS 7: 285). Endemic to the Bukit Tavai ultramafics, Sabah. Apparently allied to the Philippine cleistocalycine *Syzygium arcuatinervis* Merrill of unknown ecology (see above).

Syzygium steenisii Merr. & L.M.Perry (TFSS 7: 287). The following collections from Mount Kinabalu, at 1500–3100 m in upper montane forest on ultramafic substrates, differ from the type in their more robust and larger parts. I do not regard these differences as being sufficiently consistent to merit formal status for this form: *Carr SFN 27654* Pakka Pakka, *RSNB 4748* (*Chew & Corner*) Mesilau Cave, *RSNB 7129* (*Chew & Corner*) Mesilau R., *RSNB 4421* (*Chew & Corner*) Bambangan R., *RSNB 757* (*Chew, Corner & Stainton*) Eastern Shoulder.

Several ultramafic and karst entities within the Jambosa Group include the following:

Syzygium penibukanense Merr. & L.M.Perry (TFSS 7: 261). In mixed dipterocarp forest on sandy soils near the coast and on ultramafics, and in upper dipterocarp forest at 700–1500 m.

Syzygium silamense P.S.Ashton (TFSS 7: 284). One of several point endemics of the Silam, E. Sabah ultramafics; distinguished by its winged twigs, relatively small leaf, and very small young fruit indicating the flower (so far unknown) to be exceptionally small for this alliance.

Syzygium subisense P.S.Ashton (TFSS 7: 289). Another local endemic of the Jambu alliance, on the Niah limestone; distinguished by its terete twig, relatively long slender panicle and small flowers.

Syzygium ultramaficum P.S.Ashton (TFSS 7: 295). On ultramafic and limestone substrates in lowland mixed dipterocarp forest, coastal islands, and lower montane forest. On exposed cliffs and screes. A sister species of *Syzygium subisense,* which differs in its larger leaf with more veins, tertiaries visible beneath not above and black-drying stalk; and of *S. penibukanense*.

FIELD COMMENTS ON *TRISTANIOPSIS* SPECIES

Tristaniopsis species show similar variability to those of *Syzygium,* although their small dry narrowly winged seeds are wind-dispersed, in our case in a generally windless climate. There may be frequent hybridization. I have defined species primarily on the number of stamens in a cluster opposite each petal, combined with characters of leaf, notably shape. Their bark is often distinct at maturity, providing an invaluable additional field diagnostic character. I recognize subspecies when entities conform to these primary characters, and which resemble one another in general field character, but which differ in lesser characters of indumentum, and size of parts. *Tristaniopsis whiteana* ssp. *monostemon* presents a special case, differing in its number of stamens as well as bark, but impossible to identify in the herbarium without floral dissection (see below). The subspecies I recognize in *Tristaniopsis microcarpa* P.S.Ashton, a species distinguished by its sessile oblanceolate leaf blade and few stamens, do also differ in their inflorescence morphology and tree stature. They may, especially, prove to be distinct species on further study (TFSS 7: 308–322).

Tristaniopsis anomala (Merr.) P.G.Wilson & J.T.Waterh. (TFSS 7: 311). Difficult to distinguish from *Tristaniopsis bilocularis* in the field. The twig and leaf stalk of that species is somewhat stouter, the venation more distinctly raised on the leaf above.

Tristaniopsis beccarii (Ridl.) P.G.Wilson & J.T.Waterh. (TFSS 7: 313). *S 23704* and *S 19596*, from the Bukit Iju, Arip, Sarawak rhyolite differ in their short leaf stalks and caducously pubescent leaf and cyme. They may represent hybrids, or another entity.

Tristaniopsis bilocularis (Stapf) P.G.Wilson & J.T.Waterh. (TFSS 7:313). Close to and possibly hybridizing with *Tristaniopsis anomala*; at Bt Sampandai Sempurau. Kapit collection, *S 76983*, in flower, differs from *S 40707* from the same locality, cited under *T. anomala,* only in the number of stamens.

Tristaniopsis kinabaluensis P.S.Ashton (TFSS 7: 315). Several collections, in fruit or young bud, differ in their less leathery, dull but not glaucous, leaf blades. These include *S 30427 Chai, S 4289 Anderson, S 30818*, *Abg. Mochtar et al.* G. Api, Mulu N. P; *S 38259 B. Lee,* Bt. Berar, Mulu N.P.; *S 49609 Abg. Mochtar et al.,* Mulu N.P.; *S 41131 Yii, P.C.,* Sabal F.R., Serian; also *RSNB 4148*, *J.H. Beaman 9381* Mesilau R., *SAN 33924*, road to Kambarangoh, Kinabalu N.P.. They were collected from organic soils on limestone up to 1500 m altitude at Mulu, and on sandstone up to 1800 m. Good flowering material is awaited before their identity can be confirmed.

Tristaniopsis whiteana (Griff.) P.G.Wilson & J.T.Waterh. subspecies *whiteana* (TFSS 7: 322): A generally easily recognized species owing to its pale smooth fresh bark making the groups of trees stand out on high steep slopes, and the glistening dark olive-drying leaves and dense subequal veins. Nevertheless, collections resembling it in their 3 stamens per cluster yet with somewhat duller smaller oblanceolate fewer veined leaves with shorter stalk, have been gathered from the Mulu, Sarawak, karst limestone (*S 30427*, *4289*, *30818* G. Api, *S 49609*, G. Mulu N.P., *S 38259* G. Berar) and from Kinabalu (*RSNB 4432* Bambangan R., *Chew & al. 73* Kinabalu east shoulder, *Clemens 28406* Tenompok, *Clemens 32428* Colombon R.); both 900–1500 m in lower montane forest. They may represent a separate entity. Ssp. *monostemon* P.S.Ashton (TFSS *loc. cit.*) is at once recognizable in the filed on account of its vivid russet-brown bark, overall smooth, gleaming against the overall grey-green of the *kerangas* habitat. But Kew botanists, with access only to herbarium collections, long vigorously denied its separate identity. Its solitary stamen opposite each petal suffices even here.

NOMENCLATURAL CHANGES

I had the good fortune, at the Arnold Arboretum, to have access to fragments of the types of most species, obtained through the courtesy of the Director of the Rijksherbarium, Leiden in the interwar years of the last century. These, with the Harvard University Herbarium collection, and those of Kew and the Malaysian Forest Research Institute in recent years, and Kuching earlier, have provided the basis for my nomenclatural conclusions. Full citations are in my account for the Tree Flora 7 (2011) 87–330.

Syzygium elliptilimbum (Merr.) Merr. & L.M.Perry (TFSS 7: 201). Merrill & Perry (Philip. J. Sc. 79 (1950) 388) recorded this species from Mindanao and the Sulu Archipelago, reducing *S. suluensis* Merr. here; but the type of that species has a much larger flower and short hardly branched rachis.

Syzygium formosum (Wall.) Masam. EPB (1942) 528 (TFSS 7: 208). Variable in leaf shape and size, I have concluded that our species, most commonly known under the name *Eugenia pseudoformosa* King can no longer be consistently distinguished from the Burmese and easternmost Indian species of seasonal evergreen forest, *Syzygium formosum.* I here reduce several more names, recognized as species by Merrill and Perry, to this widespread entity. The type of *Jambosa mappacea* Korth., based on Korthals *s.n.,* E. Kalimantan, lacks the cream corky petiole of mature *Syzygium pseudoformosum,* which is based on *Wray 1809* (CAL, not seen), *3581*(CAL, K), *King's collector 3401*(designated lectotype by Parnell & Chantaranothai, Thai. For. Bull. 21 (1994) 99), *5389*, *6254*, (CAL, K), and *Scortechini s.n.,* (CAL, K) Perak; it also has ramiflorous flower clusters and unusually long peduncles. This variation occurs in other more recent collections from Borneo and the Peninsula, however. *Jambosa insignis* Bl. is based on *Korthals s.n.,* Martapura, Kalimantan (L, photo in A), with flowers on a terminal panicle; the leaves are unusually small, but otherwise typical. Merrill and Perry discuss its synonymy, with which I agree other than not recognizing it as separate from the present species. I have reduced *S. lilacinum* (Merr.) Merr. & L.M.Perry (holotype: *Elmer 21280*, Tawau, Sabah, UC, iso: A, NY) here too, as it differs in no consistent way from the the peninsular species. *S. formosum* differs from *S. scortechinii* (King) Chantar. & J.Parn. in its generally cream-white terete twig lacking distal shoulders on the nodes, and larger leaf blade.

Syzygium jambos (L.) Alston. (TFSS 7: 227). The type of *Jambosa leptostachya* Bl., *G. Mueller s.n., loc. incert.,* Kalimantan (L, fragment at A) bears leaves , short terminal inflorescence, and c.8 × 7 mm flower buds unmistakably of this species as I define it.

Syzygium leucophloium misnamed (TFSS 7: 307). The correct nomenclature is the following: *Syzygium cuneatum* (Bl.) Masam., Enum. Phan. Born. (1942) 527 *non S. cuneatum* Wall., Cat. (1828) 3598. Basionym: *Jambosa cuneata* Bl., Mus. Bot. Lugd.-Bat. 1 (1849) 106. Synonym: *Syzygium leucophloium* Merrill & L.M.Perry Mem. Amer. Ac. Arts 18 (1939) 174 *nom. superfl.*

Syzygium longiflorum Presl. Citations in TFSS 7: 87–330. (TFSS 7: 237). We have Masamune (1942) to thank for recognition of the current name as the first validly used in *Syzygium*. *Syzygium lineatum* (DC.) Merr. & L.M.Perry (*Myrtus lineata* Bl., 1827) is antedated by *Myrtus lineata* Swartz, 1788. Merrill and Perry (1937) retained *Syzygium lineatum, S. cerasiforme* (Bl.) Merr. & L.M.Perry, *S. javanicum* Miq. and *S. racemosum* (Bl.) DC. as separate species. Amshoff and Henderson united *Syzygium javanicum* and *S. racemosum,* Henderson under the name *Eugenia cerasiformis* which Kochummen (TFM 3 (1978) 185) followed; but Amshoff was right in regarding *S. cerasiforme* a synonym of the present species. Blume had originally recognized his *Myrtus cerasiformis* to be related to his *M. lineata,* but considered that it differed in more numerous veins drying dark purplish beneath, and in a single intramarginal vein. Blume's description implies that the type is in flower. Henderson based his conclusion on a fruiting specimen which he assumed to be the type, but did not indicate in which herbarium he saw it. In light of a fragment of a Blume collection,

which I believe to have been from the holotype, including a leaf and flower, now in the Harvard herbaria and named by Merrill (undated), and the many collections now available, I disagree. This fragment exactly matches Blume's description and distinguishing characters. The holotype, presumed to be at Leiden, was lost and had not knowingly been examined there by Merrill (Merrill & Perry 1939) or Amshoff (1945).

Syzygium medium (Korth.) Merr. & L.M.Perry. (TFSS 7: 241). I have reduced to this species *Jambosa linearis,* based on *Korthals s.n.,* G. Pamatton, S. Kalimantan (L, fragm. in A), with leafy twig and young flower, which unambiguously belongs to this species.

Syzygium pyrifolium (TFSS 7: 271). I have reduced to this species the somewhat enigmatic *Syzygium laevigatum.* The holotype of its basionym, *Eugenia laevigata, Korthals*, *s.n.,* Doesson, Kalimantan (L, photo and leaf in A), with leafy flowering twig, belongs here; but a second cited collection, *Korthals*, *s.n., loc. incert.* (L, photo in A), in bud, does not.

Syzygium racemosum (Bl.) DC. (TFSS 7: 273). Merrill and Perry distinguished *Syzygium racemosum* (holotype: *Blume s.n.,* L) and *S. javanicum* (holotype: *Horsfield s.n.,* near Surabaya, L) on the basis of twig colour and leaf base, and both from *S. cerasiforme* on the basis that they have a minutely lobed or undulate calyx, while *cerasiforme* bears sepal lobes >0.5 mm long. Henderson combined *S. racemosum* (Bl.) DC. and *S. javanicum* Miq. (ex syn. *S. euneuron* Miq.) considering that they differed only in the colour of the bark of the twigs, and the length and modes of branching of the inflorescence. He also included the following synonyms: *Eugenia cerasiformis* (Bl.) DC.*, E. expansa* Wall. ex Duthie *non* Mart., *E. jamboloides* Koord. & Valeton*, ?E. laxiflora* K.& V., *E. javensis* Koord. & Valeton*, E. zippeliana* Koord. & Valeton, *E. robinsoniana* Ridl. , *E. evansii* Ridl., *E. brunneoramea* Merr., *E. euneura* Craib *non Syzygium euneuron* Miq. I follow Amshoff in reducing *Eugenia cerasiformis* (Bl.) DC. to *Syzygium lineatum* (see under *S. longiflorum*). I adopt the name *Syzygium racemosum* over *S. javanicum*, which was published simultaneously because the name *S. javanicum* is also a synonym of *S. samarangense* and was formerly used for it.

Syzygium myrtifolium Walp., Repert. 2 (1843) 178; Masamune (1942) 534. (TFSS 7: 245). Cited by me as a generic change from *Eugenia myrtifolia* Roxb.; but Roxburgh's name is *nomen nudum,* therefore invalid. Wrongly named *Syzygium campanulatum* Korth. (1847) owing to the preemption of *Eugenia myrtifolia* Roxb. by *E. myrtifolia* Salisb.; but this does not invalidate Walpers' name, which validly uses the specific epithet for the first time in the present genus. Listed as *Syzygium syzygioides* (Miq.) Merr. in Anderson's Checklist (p. 239); referred to as *Eugenia oleina* Wight in the Tree Flora of Malaya 3 (1978) 205.

Syzygium subcrenatum Merr. & L.M.Perry (TFSS 7: 288). I have reduced to this species *Eugenia pseudocrenulata,* the new name given by Henderson for *E. crenulata* Duthie (1878) *non* Willd.(1799), based on Maingay 739 (K, iso SING). The type of Merrill's earlier name differs in its dull red-brown dry leaves, but the venation and flowers are defining.

S. cuneatum Wall., a *nomen nudum,* (*Eugenia lineata* Duthie) is synonymous with *Syzygium schmidtii* Rathakr. & N.C.Nair.

Tristaniopsis merguensis (Griff.) P.G.Wilson & J.T.Waterh. (TFSS 7: 316). I agree with the synonymy recommended by Kochummen (*ibid.* 252), but doubt whether *Tristania pontianensis* Henderson of southern Johor is distinct either. I formally reduced *Tristania grandifolia* Ridley, type: *Beccari 2489*, in fruit, whose large leaves are typical of immature trees; and *T. stellata* Ridley, type: *Haviland 1983*, Kuching, Sarawak, in which the leaves are at the small end of the observed range.

Tristaniopsis obovata (Benn.) P.G.Wilson & J.T.Waterh. (TFSS 7: 319). Apparently close to *Tristaniopsis ferruginea* (Merr.) P.G.Wilson & J.T.Waterh. of the Philippines, which differs in its more persistent tomentum; I have not seen its flowers. *Tristania clementis* Merrill is reduced here. Based on *Mary Clemens 9570*, 'Jesselton', it differs significantly only in the 5–6 stamens in a fascicle, rather than 4 in most peninsular collections; but this full range of variation is seen in other Borneo material. *Motley 33 & 320*, Bandjarmasin (K), type of *Tristania motleyi* Ridl., J. Bot. 68 (1930)37; Masamune (1942) 542 was not found, but appears from its description to belong here also.

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